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EXAMINER				
GOODWIN, DAVID J				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/581,395

Applicant(s)

TAN ET AL.

Examiner

DAVID GOODWIN

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-9 and 13-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-9 and 13-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 5, 6, 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram (US 6946732) in view of Chakravorty (US 6181569) in view of Qi (US 6774497).
3. Regarding claim 5.
4. Akram teaches making a chip package. Said package comprises a centrally located row of bond pads (202) wherein each of said bond pads is aligned in only a central row, and a plurality of conductive bumps (220a) on the plurality of bond pads (fig 7) (column 4 lines 1-10). And wherein a standoff between said chip and said substrate is provided mainly by the conductive bumps (220a) (fig 7).
5. Akram does not teach the method of making the bonds.
6. Chakravorty teaches a method of making a device. Said method comprises providing a wafer, the wafer comprising a plurality of integrated circuit chips, and dicing the wafer into a plurality of chip arrays (317) each array comprising two or more integrated circuit chips (fig 9a). Each circuit chip comprises a row of bond pads (311) aligned in a central row (fig 7). Attaching each chip array (317) to a substrate (318) (fig 9b) (column 12 lines 35-55). Dicing each array (317), attached to the substrate (318)

into individual chip scale packages, each individual chip scale package (319) comprising only one integrated circuit chip (fig 9e) (column 13 lines 5-25).

7. It would have been obvious to use the Chakravorty method to bond the device in order to form strong stable bonds at low cost.

8. Akram in view Chakravorty does not teach the mounting process.

9. Qi teaches a method of making a device. Said method comprises a chip (110) comprising a plurality of bond pads (114) aligned on an upper surface of the integrated circuit chip, wherein each bond of said bond pads is aligned in a row (fig 1). A plurality of conductive bumps (120) formed on the plurality of bond pads (114) (fig 1) (column 4 lines 45-65). Mounting each chip on a substrate (240) such that the bumps align with corresponding solder pad openings (242) on an upper surface of the substrate (240) (fig 2a). Reflowing the chips thereby melting the bumps and establishing a conductive joint between the integrated circuit chips and the substrate (fig 2b). Under fill encapsulating the integrated circuit chip on the substrate (fig 2b) (column 6 lines 1-45).

10. It would have been obvious to one of ordinary skill in the art to form a chip having bond pads so that conductive traces can be connected to the chip.

11. Regarding claim 6.

12. Qi teaches, prior to mounting, dipping each array in flux material such that flux (124) material adheres to the bumps (120) (fig 1). Wherein each array is mounted on a substrate the flux material adheres the bumps to the solder pad openings (242) (fig 2a) (column 5 lines 20-25).

13. Regarding claim 13.

14. Chakravorty teaches prior to mounting each array on a substrate, providing a wafer comprising a plurality of integrated circuit chips (317). Dicing (316) the wafer into of integrated circuit chips comprising two or more integrated circuit chips (9a).
15. Regarding claim 20.
16. Akram teaches that the standoff between the chip (226) and the substrate (210) is only provided by the conductive bumps (220a)
17. Qi teaches that a standoff between said chip (110) and said substrate (240, 242) is provided only by said conductive bumps (220,214,224).
18. Claims 14, 15, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty (US 6181569) in view of Qi (US 6774497).
19. Regarding claim 14.
20. Chakravorty teaches a method of mounting a chip scale package. Said method comprises mounting an array of integrated circuits (317) on a substrate (318). Each integrated circuit chip (317) comprising a plurality of bond pads (311) on an upper surface of the integrated circuit chip wherein each of said bond pads is aligned in a plurality of central rows (fig 7). A plurality of conductive bumps (314) formed on the plurality of bond pads (311). Attaching each chip array (317) to a substrate (318) (fig 9b) (column 12 lines 35-55). Dicing each array (317), attached to the substrate(318) into individual chip scale packages, each individual chip scale package (319) comprising only one integrated circuit chip (fig 9e) (column 13 lines 5-25).
21. Chakravorty does not teach the mounting process.

22. Qi teaches a method of making a device. Said method comprises a chip (110) comprising a plurality of bond pads (114) aligned on an upper surface of the integrated circuit chip, wherein each bond of said bond pads is aligned in a row (fig 1). A plurality of conductive bumps (120) formed on the plurality of bond pads (114) (fig 1) (column 4 lines 45-65). Mounting each chip on a substrate (240) such that the bumps align with corresponding solder pad openings (242) on an upper surface of the substrate (240) (fig 2a). Reflowing the chips thereby melting the bumps and establishing a conductive joint between the integrated circuit chips and the substrate (fig 2b). Under fill encapsulating the integrated circuit chip on the substrate (fig 2b) (column 6 lines 1-45). Wherein a standoff between said chip (110) and said substrate (240) is provided mainly by said conductive bumps (220).

23. It would have been obvious to one of ordinary skill in the art to form a chip having bond pads so that conductive traces can be connected to the chip.

24. Regarding claim 15.

25. Qi teaches, prior to mounting, dipping each array in flux material such that flux (124) material adheres to the bumps (120) (fig 1). Wherein each array is mounted on a substrate the flux material adheres the bumps to the solder pad openings (242) (fig 2a) (column 5 lines 20-25).

26. Regarding claim 19.

27. Chakravorty teaches prior to mounting each array on a substrate, providing a wafer comprising a plurality of integrated circuit chips (317). Dicing (316) the wafer into of integrated circuit chips comprising two or more integrated circuit chips (9a).

28. Regarding claim 21.

29. Qi teaches that a standoff between said chip (110) and said substrate (240, 242) is provided only by said conductive bumps (220,214,224).

30. Claim 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram (US 6946732) in view of Chakravorty (US 6181569) in view of Qi (US 6774497) as applied to claim 6 and further in view of Lance (US 5697148)

31. Regarding claim 7

32. Akram in view of Chakravorty in view of Qi teaches elements of the claimed invention above.

33. Akram in view of Chakravorty in view of Qi does not teach cleaning the flux from the device

34. Lance teaches cleaning the flux from the device (column 1 lines 20-35).

35. It would have been obvious to one of ordinary skill in the art to clean the flux from the device in order to prevent corrosion.

36. Regarding claim 8

37. Akram in view of Chakravorty in view of Qi teaches elements of the claimed invention above.

38. Akram in view of Chakravorty in view of Qi does not teach injecting the encapsulant.

39. Lance teaches injecting the encapsulant (22) between the chip (12) and the substrate (14).

40. It would have been obvious to one of ordinary skill in the art to inject the encapsulant in order to alleviate problems of thermal mismatch.
41. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akram (US 6946732) in view of Chakravorty (US 6181569) in view of Qi (US 6774497) as applied to claim 5 and further in view of Ho (US 6849955)
42. Regarding claim 9.
43. Akram in view of Chakravorty in view of Qi teaches elements of the claimed invention above.
44. Akram in view of Chakravorty in view of Qi does not teach solder balls formed on the backside of the substrate.
45. Ho teaches forming solder balls (510) formed on the back side of the carrier substrate (100) (fig 8).
46. It would have been obvious to one of ordinary skill in the art to form solder balls on the back side of the carrier substrate in order for the substrate to be electrically connected to a circuit board.
47. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty (US 6181569) in view of Qi (US 6774497) as applied to claim 15 and further in view of Lance (US 5697148)
48. Regarding claim 16
49. Chakravorty in view of Qi teaches elements of the claimed invention above.
50. Chakravorty in view of Qi does not teach cleaning the flux from the device
51. Lance teaches cleaning the flux from the device (column 1 lines 20-35).

52. It would have been obvious to one of ordinary skill in the art to clean the fluc from the device in order to prevent corrosion.

53. Regarding claim 17

54. Chakravorty in view of Qi teaches elements of the claimed invention above.

55. Chakravorty in view of Qi does not teach injecting the encapsulant.

56. Lance teaches injecting the encapsulant (22) between the chip (12) and the substrate (14).

57. It would have been obvious to one of ordinary skill in the art to inject the encapsulant in order to alleviate problems of thermal mismatch.

58. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty (US 6181569) in view of Qi (US 6774497) as applied to claim 14 and further in view of Ho (US 6849955)

59. Regarding claim 18.

60. Chakravorty in view of Qi teaches elements of the claimed invention above.

61. Chakravorty in view of Qi does not teach solder balls formed on the backside of the substrate.

62. Ho teaches forming solder balls (510) formed on the back side of the carrier substrate (100) (fig 8).

63. It would have been obvious to one of ordinary skill in the art to form solder balls on the back side of the carrier substrate in order for the substrate to be electrically connected to a circuit board.

Response to Arguments

64. Applicant's arguments with respect to claims 5-9 and 13-20 have been considered but are moot in view of the new ground(s) of rejection.

65. The applicant argues that Aram does not teach that the standoff is provided mainly by the conductive bumps.

66. As can be seen in figures 2 through 7, the stand off (218) is equal to the thickness of the conductive bump. If the conductive bump was not equal to the thickness of the standoff it would not achieve the intended purpose of providing an electrical connection between the chip and the substrate. Similarly Chakravorty and Qi teach a standoff that is equal to the thickness of the conductive bump, for the same reasons of necessity.

67. The applicant argues against combining Akram with Charavorty because Akram teaches another method of forming a strong stable connection.

68. Chakravorty teaches an alternative method applied to the prior art of Akram to achieve the obvious reason of forming a strong stable connection. There is no suggestion that the prior art would not be compatible or cannot be combined with the method of Chakravorty. MPEP 2145. Further, the method of stabilizing the connection taught by Akram would be compatible with the combination of Chakravorty and the prior art of Akram leading to the obvious and useful property of being even stronger and more stable.

Conclusion

69. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID GOODWIN whose telephone number is (571)272-8451. The examiner can normally be reached on Monday through Friday, 9:00am through 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on (571)272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Djg

/STEVEN LOKE/
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